

MECHANICAL ENGINEERING MAJOR

Department: Mechanical Engineering (<https://catalog.bradley.edu/undergraduate/engineering-technology/mechanical-engineering/>)

The baccalaureate program in mechanical engineering is accredited by the Engineering Accreditation Commission of ABET, <https://www.abet.org> (<https://www.abet.org/>).

Mission and Objectives

The mission of the Mechanical Engineering Department is to produce mechanical engineering graduates who possess the acumen, competence, and skills needed to enter, succeed, and lead in professional practice and/or graduate school. The goal is to provide a learning and nurturing environment that stimulates faculty and students to collaborate in solving practical problems, motivates lifelong learning, and helps them reach their highest potential.

The program educational objectives of the department are that alumni meet the following goals within a few years of graduation from the mechanical engineering program:

1. Are in professional practice or are pursuing advanced studies in mechanical engineering or related fields.
2. Are using their educational foundation to engage in lifelong learning
3. Are engaged and adding value in multidisciplinary environments through local, regional, national or international practice to meet global technological and societal changing needs.

Student Outcomes

In order to meet these program educational objectives, students graduating from Bradley's mechanical engineering program will attain the following outcomes.

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. an ability to communicate effectively with a range of audiences
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative environment, establish goals, plan tasks, and meet objectives.
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

Mechanical engineering is the broadest and most versatile of the engineering professions. Mechanical engineers are particularly concerned with the application of science and technology to translate

ideas and theories into realistic engineering solutions that satisfy the needs of society, by using a combination of human, material, and economic resources. The broad discipline of mechanical engineering can be organized into two main branches, namely mechanical systems and thermal systems.

- Within mechanical systems, the following specialties may be pursued: applied mechanics, dynamic and control systems including robotics, materials, nanotechnology, and micro-electromechanical systems (MEMS).
- Within thermal systems, the following specialties may be pursued: energy systems, including aerospace, diesel and gasoline engine power, gas turbines, and solar energy, fluid dynamics, heat transfer, and air pollution control.
- Spanning both branches are the following specialties: bioengineering and computer and microprocessor applications

In addition to the specific requirements listed for the Caterpillar College of Engineering and Technology, a minimum grade point average of 2.25 in mechanical engineering courses must be achieved in order to graduate.

The academic advisors work closely with students on their BSME program of study tailored to their academic background, interest and career goals. Students have the option to complete the **Bachelor of Science in Mechanical Engineering** program with or without declaring an area of concentration (Biomedical (<https://catalog.bradley.edu/undergraduate/programs/mechanical-engineering-biomedical-concentration/>), Chemical Engineering (<https://catalog.bradley.edu/undergraduate/programs/mechanical-engineering-chemical-engineering-concentration/>), Energy (<https://catalog.bradley.edu/undergraduate/programs/mechanical-engineering-energy-concentration/>), or Robotics and Autonomous Vehicles (<https://catalog.bradley.edu/undergraduate/programs/mechanical-engineering-robotics-autonomous-vehicles-concentration/>)). The listed courses, an expected total of **127 hours**, leading to the Bachelor of Science in Mechanical Engineering. The Mechanical Engineering curriculum consists of:

Code	Title	Hours
Bradley Core Curriculum		
BCC Communications Oral Communications (BCC – CM)		3.0
COM 103	The Oral Communication Process	
BCC Communications Writing (BCC – W1)		3.0
ENG 101	English Composition	
BCC Communications Advanced Writing (BCC – W2). Select one of the following:		3.0
ENG 300	Advanced Writing–Exposition	
ENG 301	Advanced Writing - Argumentative Writing	
ENG 305	Advanced Writing–Technical Writing	
ENG 306	Advanced Writing–Business Communication	
BCC Fine Arts (BCC – FA)		3.0
BCC Global Perspectives (BCC – GP)		3.0
BCC Humanities (BCC – HU)		3.0
Mathematics and Basic Sciences		
CHM 110	General Chemistry I (BCC – NS1)	3.0
CHM 111	General Chemistry I Lab	1.0
CHM 112	Engineering Chemistry (Engineering 2)	3.0
or CHM 116	General Chemistry II	
MTH 121	Calculus I (BCC – QR1)	4.0
MTH 122	Calculus II (BCC – QR2)	4.0

MTH 223	Calculus III	4.0
MTH 224	Elementary Differential Equations	3.0
PHY 110	University Physics I (BCC – NS2)	4.0
PHY 201	University Physics II	4.0
Required Courses		
C E 150	Statics (Statics)	3.0
C E 250	Dynamics (Dynamics)	3.0
C E 270	Mechanics of Materials	3.0
ECE 227	Electrical Engineering Fundamentals	4.0
Select one of the following:		3.0
ECO 100	Introduction to Economics (BCC – SB)	
ECO 221	Principles of Microeconomics (BCC – SB)	
ECO 222	Principles of Macroeconomics (BCC – SB)	
IME 301	Engineering Economy I (BCC – MI)	3.0
or ECO 332	Intermediate Microeconomics	
M E 101	Foundations of Mechanical Engineering	2.0
M E 102	Engineering Design Graphics	2.0
M E 273	Computational Methods in ME	3.0
M E 301	Thermodynamics I	3.0
M E 302	Thermodynamics II	2.0
M E 303	Instrumentation and Measurement	3.0
M E 308	Thermodyn Fluid Flow	4.0
M E 341	Engineering Systems Dynamics	3.0
M E 342	Design of Machine Elements	3.0
M E 344	Kinematics and Dynamics of Machines	3.0
M E 351	Engineering Materials Science I	3.0
M E 403	Mechanical Engineering Systems Laboratory	3.0
M E 415	Introduction to Heat Transfer	3.0
M E 441	Mechanical Control Systems	3.0
ME Senior Capstone Project II. Select one of the following (BCC-WI, EL): ¹		2.0
M E 411	Mechanical Engineering Senior Design Project II (BCC – WI, EL)	
M E 498	ME Senior Research Project I	
ME Senior Capstone Project I. Select one of the following (BCC-WI, EL): ¹		3.0
M E 410	Mechanical Engineering Senior Project I (BCC - WI, EL)	
M E 498	ME Senior Research Project I (BCC - WI, EL)	

¹ ME Senior Capstone Projects require a 2-semester sequence of either an industrial based or academic research based design project - either M E 410 Mechanical Engineering Senior Project I and M E 411 Mechanical Engineering Senior Design Project II or M E 498 ME Senior Research Project I and M E 499 ME Senior Research Project II— Enrollment in these courses is restricted to mechanical engineering students who are within the three semesters of graduation from the program.

Approved Technical Elective Courses

Students with a concentration should see the specific list of technical elective courses under their concentration. For students without a concentration, at least four of the technical electives (12 hrs.) must be

Mechanical Engineering Technical Elective courses from the following list:

Code	Title	Hours
M E 354	Principles of Materials Science Laboratory Practices	3.0
M E 407	Power Plant Design	3.0
M E 409	Mechanical Engineering Projects	1.0-4.0
M E 448	Computer Aided Design in Mechanical Engineering	3.0
M E 491	Special Topics in Mechanical Engineering	3.0
All 500 level M E courses		

M E 409 Mechanical Engineering Projects may be repeated; only 6 hours of M E 409 Mechanical Engineering Projects will count towards the degree completion. M E 491 Special Topics in Mechanical Engineering/M E 591 Topics in Mechanical Engineering may be repeated up to three (3) times (different topics) for technical elective credit.

The remaining elective requirement (3 hrs.) may be satisfied by ME courses from the above list or by non-required courses from other disciplines as listed below.

- Biology: BIO 310 to BIO 599
- Chemistry: CHM 252 Organic Chemistry I, CHM 256 Organic Chemistry II, and CHM 320 to CHM 599
- Computer Science: C S 210 , C S 321 to C S 599
- Computer Information Systems: CIS 377 to 446, CIS 545 Integrative Programming and Technology
- Mathematics: MTH 207 Elementary Linear Algebra With Applications, MTH 302 to MTH 599
- Physics: PHY 202 Applied Quantum Physics, PHY 305 to PHY 599
- Civil Engineering: C E 310 to C E 599
- Electrical Engineering: ECE 301 to ECE 599
- Industrial and Manufacturing Engr: IME 311 to IME 325, IME 341 to IME 599
- Entrepreneurship: ENT 381 Entrepreneurship for Non-Business Students, ENT 385 Technology Entrepreneurship
- Business: BUS 361 Collaboration in Organizations, BUS 362 Innovation in Organizations
- Turner School of Entrepreneurship and Innovation: SEI 330 Intellectual Capital Mgmt Primer

Plan of Elective Study

To allow a student to earn a second major, a minor, and/or increase flexibility in developing an area of specialization, exceptions to the four ME tech electives policy may be granted on petition to the Mechanical Engineering Curriculum Committee. Students requesting an exception must submit a Plan of Elective Study with a recommendation from their advisor. This plan should outline the student's professional goals, their relationship to the courses in their plan and further documentation and evidence justifying proposed elective courses. This plan is then submitted to the Mechanical Engineering Curriculum Committee. Only courses on the individual student's Plan and approved no later than the first day of classes of the semester in which they are taken will count as technical electives.

Elective Plan Appeals Process

Appeal requests of the approval decisions should be sent to the ME Curriculum Committee by the student. If the Curriculum Committee's

decision is not satisfactory, the Mechanical Engineering Faculty must approve any petition for exceptions to the Technical Elective Policy stated above.

Introductory Course Exception

Students who do not earn credit for M E 101 Foundations of Mechanical Engineering at Bradley may be required to take a 6th technical elective to replace those credit hours. Introductory courses from other engineering departments or EGT 101 Introduction to Engineering & Technology are accepted in lieu of M E 101 Foundations of Mechanical Engineering.